

**Appendix A**

**Supporting Data**

**2006 SBOO Stations**

**Ocean Conditions**



## Appendix A.1a

Mean data at all surface depths ( $\leq 2$  m) for 2006 is compared to mean data and standard deviations ( $\pm 1$  SD) for 1995–2005 at stations I9, I12, I22, and I27, and difference ( $\Delta$ ) between 2006 and 1995–2005 mean data. Data includes temperature ( $^{\circ}\text{C}$ ), salinity (ppt), density ( $\delta/\theta$ ), dissolved oxygen (mg/L), pH, transmissivity (%), and chlorophyll *a* ( $\mu\text{g}/\text{L}$ ).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Temperature</i>												
2006	14.5	13.8	13.2	14.3	16.1	18.5	20.1	18.7	18.7	17.3	17.5	15.7
1995–2005	14.7	14.1	14.6	15.2	17.2	18.9	18.2	18.6	20.1	18.6	17.1	15.6
SD	1.0	1.1	1.0	1.0	1.9	1.7	1.4	1.4	2.2	1.5	1.1	1.2
$\Delta$	-0.2	-0.3	-1.4	-0.9	-1.2	-0.4	1.9	0.1	-1.4	-1.3	0.4	0.1
<i>Salinity</i>												
2006	33.35	33.40	33.43	33.44	33.57	33.56	33.56	33.45	33.43	33.41	33.43	33.50
1995–2005	33.44	33.45	33.44	33.54	33.58	33.64	33.62	33.54	33.54	33.48	33.46	33.47
SD	0.23	0.12	0.21	0.14	0.10	0.12	0.18	0.12	0.14	0.12	0.15	0.13
$\Delta$	-0.08	-0.05	-0.01	-0.10	-0.01	-0.09	-0.06	-0.09	-0.11	-0.07	-0.02	0.03
<i>Density</i>												
2006	24.80	24.99	25.13	24.92	24.64	24.04	23.63	23.90	23.89	24.22	24.19	24.66
1995–2005	24.82	24.95	24.85	24.80	24.35	23.99	24.07	23.99	23.68	24.00	24.27	24.70
SD	0.23	0.22	0.31	0.27	0.45	0.40	0.39	0.37	0.60	0.37	0.27	0.26
$\Delta$	-0.02	0.04	0.28	0.12	0.29	0.05	-0.44	-0.09	0.21	0.22	-0.08	-0.04
<i>Dissolved oxygen</i>												
2006	8.3	9.5	9.2	8.7	9.5	9.8	8.2	8.0	8.2	7.9	7.6	7.7
1995–2005	7.9	7.9	8.7	8.5	8.3	8.4	8.4	8.4	7.8	8.1	7.9	7.8
SD	0.5	1.0	0.9	1.0	1.2	0.7	0.9	1.3	1.1	1.0	0.9	0.8
$\Delta$	0.4	1.6	0.5	0.2	1.2	1.4	-0.2	-0.4	0.4	-0.2	-0.3	-0.1
<i>pH</i>												
2006	8.1	8.2	8.2	8.2	8.3	8.4	8.2	8.2	8.2	8.2	8.1	8.1
1995–2005	8.1	8.1	8.1	8.1	8.2	8.1	8.1	8.1	8.1	8.2	8.1	8.1
Std_Dev	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1
$\Delta$	0.0	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.1	-0.0	0.0	0.0
<i>Transmissivity</i>												
2006	80	77	70	73	79	75	78	83	82	87	83	76
1995–2005	84	83	79	79	82	82	81	81	84	84	85	84
SD	6	6	7	8	5	7	6	6	7	9	3	10
$\Delta$	-4	-6	-9	-6	-3	-7	-3	2	-2	3	-2	-8
<i>Chlorophyll a</i>												
2006	2.8	7.5	9.4	4.6	6.8	12.1	3.0	2.4	2.7	2.1	1.8	2.2
1995–2005	4.1	4.1	4.3	7.3	4.5	4.2	3.2	3.3	4.1	4.7	3.0	4.5
SD	2.0	1.9	2.1	5.9	2.4	2.7	1.4	1.8	3.2	7.6	2.3	3.0
$\Delta$	-1.3	3.4	5.1	-2.7	2.3	7.9	-0.2	-0.9	-1.4	-2.6	-1.2	-2.3

## Appendix A.1b

Mean data at mid-depths ( $\geq 10$  and  $\leq 27$ ) m for 2006 is compared to mean historical data and standard deviations ( $\pm 1$  SD) for 1995–2005 at stations I9, I12, I22, and I27, and difference ( $\Delta$ ) between 2006 and 1995–2005 mean data.. Data includes temperature ( $^{\circ}\text{C}$ ), salinity (ppt), density ( $\sigma/\theta$ ), dissolved oxygen (mg/L), pH, transmissivity (%), and chlorophyll a ( $\mu\text{g/L}$ ).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Temperature</i>												
2006	14.3	13.3	11.7	10.9	11.4	15.2	13.8	13.6	14.8	15.2	16.4	15.3
1995–2005	14.4	13.5	13.3	12.9	13.0	13.3	13.2	13.1	14.8	15.0	15.3	14.9
SD	1.2	1.2	1.3	1.4	2.3	2.0	1.8	1.5	2.5	2.2	1.6	1.2
$\Delta$	-0.1	-0.2	-1.6	-2.0	-1.6	1.9	0.6	0.5	-0.0	0.2	1.1	0.4
<i>Salinity</i>												
2006	33.36	33.42	33.54	33.68	33.62	33.63	33.52	33.42	33.45	33.39	33.40	33.49
1995–2005	33.49	33.51	33.50	33.61	33.63	33.66	33.60	33.53	33.48	33.41	33.41	33.45
SD	0.20	0.18	0.19	0.13	0.11	0.12	0.14	0.14	0.11	0.11	0.15	0.15
$\Delta$	-0.13	-0.09	0.04	0.07	-0.01	-0.03	-0.08	-0.11	-0.03	-0.02	-0.01	0.04
<i>Density</i>												
2006	24.85	25.10	25.51	25.76	25.63	24.86	25.08	25.05	24.81	24.67	24.41	24.74
1995–2005	24.92	25.14	25.17	25.33	25.31	25.28	25.19	25.20	24.83	24.75	24.63	24.80
SD	0.27	0.26	0.35	0.34	0.51	0.41	0.44	0.34	0.60	0.47	0.39	0.31
$\Delta$	-0.07	-0.04	0.34	0.43	0.32	-0.42	-0.11	-0.15	-0.02	-0.08	-0.22	-0.06
<i>Dissolved Oxygen</i>												
2006	8.1	8.5	6.5	5.2	5.4	8.2	7.6	7.3	7.9	8.0	7.7	7.3
1995–2005	7.8	7.7	7.6	7.4	7.2	8.0	8.5	8.5	8.3	8.6	7.8	8.0
SD	0.6	0.9	1.1	1.4	1.7	1.5	1.2	1.4	1.4	1.5	0.7	0.5
$\Delta$	0.3	0.8	-1.1	-2.2	-1.8	0.2	-0.9	-1.2	-0.4	-0.6	-0.1	-0.7
<i>pH</i>												
2006	8.1	8.2	8.0	7.9	7.9	8.1	8.1	8.1	8.1	8.1	8.1	8.1
1995–2005	8.0	8.0	8.0	7.9	8.0	8.0	8.0	8.0	8.1	8.1	8.1	8.1
SD	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1
$\Delta$	0.1	0.2	0.0	-0.0	-0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
<i>Transmissivity</i>												
2006	81	80	81	85	86	79	84	88	86	87	86	80
1995–2005	85	83	85	82	84	82	85	85	86	87	86	86
SD	5	7	6	6	5	6	5	5	3	4	3	3
$\Delta$	-4	-3	-4	3	2	-3	-1	3	0	0	0	-6
<i>Chlorophyll a</i>												
2006	5.2	10.3	10.2	3.6	6.1	11.7	5.7	3.9	5.1	3.7	2.8	3.2
1995–2005	5.1	6.9	5.1	8.5	7.2	8.5	4.6	6.5	5.7	4.0	5.0	6.1
SD	2.1	6.0	1.9	6.9	4.4	5.8	3.5	4.9	4.2	2.3	3.1	3.4
$\Delta$	0.1	3.4	5.1	-4.9	-1.1	3.2	1.0	-2.6	-0.6	-0.3	-2.2	-2.9

## Appendix A.1c

Mean data at bottom depths ( $\geq 27$  m) for 2006 is compared to mean historical data and standard deviations ( $\pm 1$  SD) for 1995–2005 at stations I9, I12, I22, and I27, and difference ( $\Delta$ ) between 2006 and 1995–2005 mean data.. Data includes temperature ( $^{\circ}\text{C}$ ), salinity (ppt), density ( $\delta/\theta$ ), dissolved oxygen (mg/L), pH, transmissivity (%), and chlorophyll a ( $\mu\text{g}/\text{L}$ ).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Temperature</i>												
2006	12.4	12.1	10.3	10.2	10.5	11.6	11.8	12.1	12.6	13.3	14.5	14.8
1995–2005	13.9	12.5	12.4	11.4	11.5	11.4	11.9	12.2	13.5	13.9	14.6	14.4
SD	1.3	1.1	1.0	0.7	1.0	0.5	1.5	1.3	2.0	1.8	1.5	1.3
$\Delta$	-1.5	-0.4	-2.1	-1.2	-1.0	0.2	-0.1	-0.1	-0.9	-0.4	-0.1	0.4
<i>Salinity</i>												
2006	33.40	33.49	33.78	33.82	33.73	33.66	33.54	33.48	33.48	33.38	33.40	33.48
1995–2005	33.48	33.56	33.58	33.67	33.66	33.66	33.61	33.56	33.48	33.44	33.42	33.43
SD	0.18	0.15	0.18	0.12	0.10	0.10	0.15	0.12	0.11	0.10	0.13	0.19
$\Delta$	-0.08	-0.07	0.20	0.15	0.07	-0.00	-0.07	-0.08	0.00	-0.06	-0.02	0.05
<i>Density</i>												
2006	25.26	25.40	25.95	26.00	25.88	25.63	25.49	25.38	25.29	25.07	24.84	24.85
1995–2005	25.02	25.36	25.39	25.67	25.64	25.66	25.49	25.39	25.08	24.98	24.79	24.89
SD	0.28	0.24	0.31	0.17	0.22	0.14	0.40	0.28	0.49	0.44	0.34	0.34
$\Delta$	0.24	0.04	0.56	0.33	0.24	-0.03	-0.00	-0.01	0.21	0.09	0.05	-0.04
<i>Dissolved Oxygen</i>												
2006	6.5	5.9	4.0	3.7	4.0	4.3	5.2	6.0	6.1	7.3	7.2	6.7
1995–2005	7.3	6.5	6.3	5.2	5.4	5.7	6.3	7.2	7.6	7.8	7.3	7.4
SD	0.8	0.7	1.3	0.9	1.4	1.5	1.2	1.1	1.7	2.0	0.9	0.8
$\Delta$	-0.8	-0.6	-2.3	-1.5	-1.4	-1.4	-1.1	-1.2	-1.5	-0.5	-0.1	-0.7
<i>pH</i>												
2006	8.0	8.0	7.8	7.8	7.8	7.8	7.9	8.0	7.9	8.1	8.1	8.0
1995–2005	8.0	7.9	7.9	7.8	7.8	7.8	7.9	7.9	8.0	8.0	8.0	8.0
Std_Dev	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
$\Delta$	-0.0	0.1	-0.1	0.0	-0.0	0.0	0.0	0.1	-0.1	0.1	0.0	0.0
<i>Transmissivity</i>												
2006	85	85	88	88	91	88	89	90	90	89	89	82
1995–2005	74	67	72	76	83	82	85	84	84	81	82	79
SD	12	20	19	10	5	7	4	6	5	9	7	10
$\Delta$	10	18	16	12	8	6	4	6	6	8	7	3
<i>Chlorophyll a</i>												
2006	2.9	2.7	0.8	1.2	1.3	2.9	3.5	2.4	2.2	4.5	2.4	1.9
1995–2005	4.3	4.7	4.7	6.1	4.8	6.1	5.8	4.9	4.1	4.9	3.8	4.7
SD	2.1	2.5	2.9	3.1	3.0	4.7	4.9	2.5	2.0	2.8	2.6	2.8
$\Delta$	-1.4	-2.0	-3.9	-4.9	-3.5	-3.2	-2.3	-2.5	-1.9	-0.4	-1.4	-2.7

## Appendix A.2

Differences between the surface ( $\leq 2$  m) and bottom ( $\geq 27$  m) waters for mean values of temperature (Temp,  $^{\circ}\text{C}$ ), salinity (ppt), density ( $\sigma/\theta$ ), dissolved oxygen (DO, mg/L), pH, transmissivity (XMS, %), and chlorophyll *a* ( $\mu\text{g}/\text{L}$ ) at SBOO kelp stations during 2006.

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Temp</b>	<i>Surface</i>	13.7	14.1	13.4	15.1	17.1	19.2	22.0	17.9	18.3	17.4	17.3	15.6
	<i>Bottom</i>	12.9	12.8	11.4	11.2	13.0	13.0	15.7	13.6	15.1	16.1	16.3	15.1
	$\Delta$	0.8	1.3	2.0	3.9	4.1	6.2	6.3	4.3	3.2	1.3	1.0	0.5
<b>Density</b>	<i>Surface</i>	24.97	24.95	25.13	24.83	24.39	23.89	23.08	24.10	23.99	24.19	24.23	24.69
	<i>Bottom</i>	25.20	25.24	25.61	25.76	25.35	25.32	24.61	25.06	24.72	24.47	24.46	24.79
	$\Delta$	-0.23	-0.29	-0.48	-0.93	-0.96	-1.43	-1.53	-0.96	-0.74	-0.28	-0.23	-0.10
<b>Salinity</b>	<i>Surface</i>	33.34	33.43	33.47	33.57	33.58	33.58	33.52	33.45	33.42	33.42	33.44	33.51
	<i>Bottom</i>	33.44	33.46	33.60	33.76	33.65	33.64	33.44	33.43	33.43	33.39	33.42	33.49
	$\Delta$	-0.10	-0.03	-0.13	-0.19	-0.07	-0.06	0.08	0.02	-0.01	0.03	0.02	0.02
<b>DO</b>	<i>Surface</i>	8.0	8.9	9.5	10.2	9.6	8.1	8.0	8.6	8.7	7.9	8.0	7.7
	<i>Bottom</i>	6.9	7.0	6.0	3.2	5.5	5.4	8.1	7.8	8.1	7.9	7.9	7.5
	$\Delta$	1.1	1.9	3.5	7.0	4.0	2.7	-0.1	0.8	0.6	-0.0	0.1	0.2
<b>pH</b>	<i>Surface</i>	8.2	8.2	8.3	8.3	8.4	8.3	8.2	8.2	8.2	8.1	8.1	8.1
	<i>Bottom</i>	8.1	8.1	8.0	7.7	7.9	7.9	8.2	8.1	8.1	8.1	8.1	8.1
	$\Delta$	0.1	0.1	0.3	0.6	0.5	0.4	0.0	0.1	0.1	0.0	0.0	0.0
<b>XMS</b>	<i>Surface</i>	67	74	71	66	71	71	80	80	80	85	79	80
	<i>Bottom</i>	77	81	77	73	79	79	85	79	81	85	80	81
	$\Delta$	-10	-7	-6	-7	-8	-8	-5	1	-1	-0	-1	-1
<b>Chl a</b>	<i>Surface</i>	4.2	9.5	4.9	17.6	6.3	7.1	2.4	3.0	2.3	2.6	2.3	2.5
	<i>Bottom</i>	6.2	10.5	12.8	9.2	12.0	8.9	2.8	12.4	5.1	3.6	5.0	3.7
	$\Delta$	-2.0	-0.9	-7.9	8.4	-5.7	-1.8	-0.5	-9.4	-2.8	-1.0	-2.7	-1.2